AMENDMENTS TO THE CLAIMS

Please find below a complete listing of the claims in the application, including their status as effected by the present amendment:

1. (*previously presented*) Apparatus for stabilizing an optical carrier frequency of a generated carrier signal with respect to a target carrier frequency, comprising:

a multi-channel optical filter for filtering the generated carrier signal, thereby to provide a first filtered optical signal and a second filtered optical signal, each said filtered optical signal including the portion of the generated carrier signal contained in a pass band surrounding a different respective channel center frequency;

a detection unit for determining an indication of a characteristic of the target carrier frequency in said first and second filtered optical signals; and

a control unit for adjusting the optical carrier frequency of the generated carrier signal as a function of the difference in the indication of said characteristic of the target carrier frequency in the first and second filtered optical signals.

2. (*currently amended*) An optical signal generation apparatus, comprising:

a plurality of apparatuses [[~~optical signal generators~~]] as claimed in claim 1;

each said apparatus [[~~optical signal generator~~]] further comprising a switch for controlling whether the respective generated carrier signal exits said apparatus [[~~optical signal generator~~]];

the control units of said apparatuses [[~~optical signal generators~~]] being interconnected and each being further adapted to control the respective switch in order ensure that the respective generated carrier signal is allowed to exit at most one of said apparatuses [[~~optical signal generators~~]]; and

a combiner for combining the carrier signals exiting the plurality of apparatuses [[~~optical signal generators~~]].

3. (*previously presented*) An optical signal generator, comprising:

an optical source adapted to generate an optical signal including at least one carrier signal at a respective generated carrier frequency that is adjustable by a corresponding frequency control signal, each carrier signal being associated with a respective target carrier frequency;

a multi-channel optical filter having a filter input port connected to the optical source and having a plurality of filter output ports, each filter output port being associated with a respective optical channel having a pass band surrounding a different respective channel center frequency;

for at least one target carrier frequency, a first and a second detection unit each associated with said target carrier frequency and connected to different ones of the filter output ports, each detection unit associated with a particular target carrier frequency being adapted to output an indication of a characteristic of the particular target carrier frequency in the optical signal present at the filter output port to which said detection unit is connected; and

a control unit connected to the detection units and to the optical source, the control unit being operable to generate the frequency control signal corresponding to a particular carrier signal as a function of the output of the detection units associated with the target carrier frequency associated with the particular carrier signal, thereby to align the generated carrier frequency of the particular carrier signal with the target carrier frequency associated with the particular carrier signal.

4. (*original*) An optical signal generator as claimed in claim 3, wherein the first detection unit associated with a particular target carrier frequency is connected to a filter output port associated with an optical channel having a channel center frequency less than the particular target carrier frequency and wherein the second detection unit associated with the particular target carrier frequency is connected to a filter output port associated with an optical channel having a channel center frequency greater than the particular target carrier frequency.

5. (*original*) An optical signal generator as claimed in claim 4, wherein the optical source is adapted to modulate at least one carrier signal in accordance with a modulation

signal having a characteristic uniquely associated with the target carrier frequency associated with the carrier signal, and wherein each detection unit associated with a particular target carrier frequency is adapted to output an indication of the extent to which said characteristic of the modulation signal associated with the particular target carrier frequency appears in the optical signal present at the filter output port to which said detection unit is connected.

6. (*original*) An optical signal generator as claimed in claim 4, wherein the optical source is adapted to modulate at least one carrier signal in accordance with a modulation signal uniquely associated with the target carrier frequency associated with the carrier signal, and wherein each detection unit associated with a particular target carrier frequency is adapted to output the amplitude of the modulation signal associated with the particular target carrier frequency appearing in the optical signal present at the filter output port to which said detection unit is connected.

7. (*original*) An optical signal generator as claimed in claim 6, wherein each modulation signal associated with a different target carrier frequency has a set of at least one unique electrical frequency.

8. (*original*) An optical signal generator as claimed in claim 5, wherein said control unit comprises a comparator connected to the first and second detection units associated with the same target carrier frequency.

9. (*original*) An optical signal generator as claimed in claim 8, said comparator being adapted to determine the difference in the amplitude of the modulation signal associated with said same target carrier frequency as measured in different optical channels, the control unit being further adapted to compare said difference to a pre-determined offset, thereby to generate the frequency control signal corresponding to the carrier signal associated with said same target carrier frequency.

10. (*original*) An optical signal generator as claimed in claim 9, wherein said pre-determined offset depends on the response of the optical filter in the pass bands of the optical channels associated with the two different filter output ports to which said first and second detection units are connected.

11. (*original*) An optical signal generator as claimed in claim 10, wherein said offset is substantially zero.

12. (*original*) An optical signal generator as claimed in claim 9, wherein the channel center frequencies and the target carrier frequencies are interleaved.

13. (*original*) An optical signal generator as claimed in claim 9, wherein the channel center frequencies are aligned with the target carrier frequencies.

14. (*original*) An optical signal generator as claimed in claim 9, wherein at least two channel center frequencies are located between each pair of adjacent target carrier frequencies.

15. (*original*) An optical signal generator as claimed in claim 3, further comprising a coarse wavelength capture module connected between at least one filter output port and the optical source, said coarse wavelength capture module being adapted to determine whether at least one generated carrier frequency is substantially outside a neighbourhood of the associated target carrier frequency and further adapted to instruct the optical source to adjust such generated carrier frequency until it is determined to be within said neighbourhood of the associated target frequency.

16. (*original*) An optical signal as claimed in claim 15, further comprising an output switch connected to the optical source, for controllably passing selected ones of the carrier signals generated by the source to a location external to the optical signal generator, said output switch being controllable by said coarse wavelength capture

module to block at least one carrier signal when its associated generated carrier frequency is outside said neighbourhood of the associated target carrier frequency.

17. (*original*) An optical signal generator as claimed in claim 7, further comprising:

for at least one target carrier frequency, a third detection unit associated with said target carrier frequency and connected to the particular filter output port whose associated channel center frequency is closest to said target carrier frequency, wherein the third detection unit associated with a particular target carrier frequency is adapted to output the amplitude of the modulation signal associated with the particular carrier frequency as it appears in the optical signal present at the filter output port to which said third detection unit is connected;

wherein the control unit is further connected to each third detection unit and wherein the control unit is further operable to adjust the amplitude of a particular carrier signal as a function of the output of the third detection unit associated with the target carrier frequency associated with the particular carrier signal.

18. (*original*) An optical signal generator as claimed in claim 3, further comprising a power combiner associated with each of at least one target carrier frequency, wherein the power combiner associated with a particular target carrier frequency comprises two inputs respectively connected to the first and second detection units associated with the particular target carrier frequency.

19. (*original*) An optical signal generator as claimed in claim 18, wherein the power combiner associated with a particular target carrier frequency is adapted to determine the total power of the modulation signal associated with the particular target carrier frequency as measured in different optical channels, the control unit being further adapted to adjust the amplitude of the carrier signal associated with the particular target carrier frequency as a function of the output of the power combiner associated with the particular target carrier frequency.

20. (*original*) An optical signal generator as claimed in claim 19, wherein each of the first and second detection units associated with a particular target carrier frequency comprises a power monitor adapted to measure a power level of the optical signal present at the filter output port to which said detection unit is connected, each of the first and second detection units associated with a particular target carrier frequency being further adapted to provide the respective measured power level to a respective input of the power combiner to which said detection unit is connected.

21. (*original*) An optical signal generator as claimed in claim 4, wherein the optical source is adapted to modulate at least one carrier signal in accordance with a modulation signal having a characteristic uniquely associated with the target carrier frequency associated with the carrier signal;

wherein each detection unit associated with a particular target carrier frequency includes:

(i) a modulation signal detector adapted to output an indication of the extent to which said characteristic of the modulation signal associated with the particular target carrier frequency appears in the optical signal present at the filter output port to which said detection unit is connected; and

(ii) a power monitor adapted to measure a power level of the optical signal present at the filter output port to which said detection unit is connected;

wherein said control unit includes:

(i) a comparator associated with the particular target carrier frequency; and

(ii) a switch having inputs connected to the modulation signal detector and the power monitor in both the first and second signal detection units associated with the particular target carrier frequency and having outputs connected to the comparator associated with the particular target carrier frequency, the switch being operable in a first state wherein the output of the modulation signal detectors is provided to

the comparator and a second state wherein the output of the power monitors is provided to the comparator.

22. (*original*) An optical signal generator as claimed in claim 21, wherein the comparator associated with a particular target carrier frequency is adapted to determine the difference between the signals received from the switch to which it is connected, the control unit being further adapted to compare said difference to a pre-determined offset, thereby to generate the frequency control signal corresponding to the carrier signal associated with the particular target carrier frequency.

23. (*original*) An optical signal generator as claimed in claim 22, each switch being operable to change states as a function of the stability of the difference determined by the comparator to which said switch is connected.

24. (*original*) An optical signal generator as claimed in claim 22, further comprising a power combiner associated with each of at least one target carrier frequency, wherein the power combiner associated with a particular target carrier frequency comprises two inputs connected to the outputs of the switch connected to the first and second detection units associated with the particular target carrier frequency.

25. (*original*) An optical signal generator as claimed in claim 24, wherein the power combiner associated with a particular target carrier frequency is adapted to determine an estimate of the total power of the modulation signal associated with the particular target carrier frequency as measured in different optical channels, the control unit being further adapted to adjust the amplitude of the carrier signal associated with the particular target carrier frequency as a function of the output of the power combiner associated with the target carrier frequency associated with the particular carrier signal.

26. (*original*) An optical signal generator as claimed in claim 3, wherein said optical signal generated by the source includes at least two carrier signals wherein the optical source comprises an optical multiplexer for combining the at least one carrier signal into

a composite optical signal, said optical multiplexer having an output port connected to the filter input port.

27. (*original*) An optical signal generator as claimed in claim 3, further comprising at least one receiver connected between a respective one of the filter output ports and at least one of the detection units, each receiver being adapted to provide opto-electronic conversion of an optical signal received from the respective filter output port into an electrical signal provided to the at least one of the detection units.

28. (*original*) An optical signal generation apparatus, comprising:

a plurality of optical signal generators as claimed in claim 3;

each said optical signal generator further comprising a switch for controllably allowing selected carrier signals to exit said optical signal generator;

the control units of said optical signal generators being interconnected and each being further adapted to control the respective switch in order ensure that the carrier signal associated with each target carrier frequency is allowed to exit at most one of said optical signal generators; and

a combiner for combining the carrier signals exiting the plurality of optical signal generators.

29. (*currently amended*) A method of stabilizing an optical carrier frequency of a generated carrier signal with respect to a target carrier frequency, comprising:

optically filtering the generated carrier signal to provide a first filtered optical signal and a second filtered optical signal, each said filtered optical signal including the portion of the generated carrier signal contained in a pass band surrounding a different channel center frequency;

determining an indication of a characteristic of the target carrier frequency in said first and second filtered optical signals; and

adjusting the optical carrier frequency of the generated carrier signal as a function of the difference in the indication of said characteristic of the target carrier frequency in the first and second filtered optical signals.

30. (*original*) A method as claimed in claim 29, said first filtered optical signal including the portion of the generated carrier signal contained in a pass band surrounding a channel center frequency that is less than the optical carrier frequency of the generated carrier signal, said second filtered optical signal including the portion of the generated carrier signal contained in a pass band surrounding a channel center frequency that is greater than the optical carrier frequency of the generated carrier signal.

31. (*original*) A method as claimed in claim 29, further comprising:

modulating the carrier signal in accordance with a modulation signal having a characteristic uniquely associated with the target carrier frequency; and

wherein determining an indication of a characteristic of the target carrier frequency in said first and second filtered optical signals comprises determining an indication of the extent to which said characteristic of the modulation signal appears in said first and second optical signals.

32. (*original*) A method as claimed in claim 31, said first filtered optical signal including the portion of the generated carrier signal contained in a pass band surrounding a channel center frequency that is less than the optical carrier frequency of the generated carrier signal, said second filtered optical signal including the portion of the generated carrier signal contained in a pass band surrounding a channel center frequency that is greater than the optical carrier frequency of the generated carrier signal.

33. (*currently amended*) Apparatus for stabilizing an optical carrier frequency of a generated carrier signal with respect to a target carrier frequency, comprising:

means for optically filtering the generated carrier signal to provide a first filtered optical signal and a second filtered optical signal, each said filtered optical signal including the portion of the generated carrier signal contained in a pass band surrounding a different respective channel center frequency;

means for determining an indication of a characteristic of the target carrier frequency in said first and second filtered optical signals; and

means for adjusting the optical carrier frequency of the generated carrier signal as a function of the difference in the indication of said characteristic of the target carrier frequency in the first and second filtered optical signals.

34. (*original*) Apparatus as claimed in claim 33, further comprising means for combining said generated carrier signal with at least one other generated carrier signal at a different optical carrier frequency.

35. (*previously presented*) Apparatus for stabilizing an optical carrier frequency of a generated carrier signal with respect to a target carrier frequency, comprising:

a detection module adapted to receive a first filtered optical signal and a second filtered optical signal, each said filtered optical signal including the portion of the generated carrier signal contained in a pass band surrounding a different respective channel center frequency, said detection module further adapted to determine an indication of a characteristic of the target carrier frequency in said first and second filtered optical signals; and

a control module for adjusting the optical carrier frequency of the generated carrier signal as a function of the difference in the indication of a characteristic of the target carrier frequency in the first and second filtered optical signals.

36. (*currently amended*) A computer readable storage medium containing a program element for execution by a computing device to implement a method of stabilizing an optical carrier frequency of a generated carrier signal with respect to a target carrier frequency, said method including:

receiving first and second optically filtered versions of the generated carrier signal, each version including a portion of the generated carrier signal contained in a pass band surrounding a <u>different</u> respective channel center frequency;

determining an indication of a characteristic of the target carrier frequency in said first and second versions of the generated carrier signal; and

determining an adjustment value for adjusting the optical carrier frequency of the generated carrier signal as a function of the difference in the indication of said

characteristic of the target carrier frequency in the first and second optically filtered versions of the generated carrier signal.